

Potential answer to citrus greening disease

St Louis-based biotechnology firm Elemental Enzymes has obtained the first US patent for a natural peptide solution, proven in extensive trials to be a successful treatment for the devastating citrus greening disease.

This crippling bacterial disease is capable of killing healthy citrus trees in less than five years. According to industry figures, it has reduced US citrus fruit yields by more than 40 per cent and caused grower losses of more than \$400M annually.

Transmitted by Asiatic citrus psyllids, citrus greening is one of the worst citrus diseases globally but is not yet present in Australia. However, it is close to our shores including in Indonesia, Papua New Guinea and East Timor, so any suspicious plant symptoms, material or psyllids must be reported immediately to Australian authorities.

In the USA, pioneering company, Elemental Enzymes has developed, extensively field-tested and patented a naturally-occurring peptide solution, which has the potential to deliver relief to citrus orchards, hope to growers, and enable the US industry to continue to affordably meet consumer demand for a wide range of citrus products.

The patented discovery by Elemental Enzymes chief executive officer Dr **Brian Thompson** is the culmination of research that looked at more than 70 potential products on infected citrus groves in Florida.

The solution – Vismax – is being readied for commercialisation, and is likely to reach market within a few



Asian citrus psyllid transmits the citrus greening bacteria which is thought to have wiped out 40% of the USA's citrus yields. (University of California image).

years. In 45 replicated field trials across Florida over the past four years, Vismax application has demonstrated increased yield, reduced infection levels, and accelerated tree recovery in treated trees.

In trials throughout 2018 and 2019, Vismax increased fresh fruit value by 19 to 25 percent from treated trees, Dr Thompson said. Vismax-treated trees also exhibited pronounced plant recovery from citrus greening symptoms. Within eight weeks, there was a 95 percent reduction in the bacteria that causes citrus greening.

The product has been tested on more than 10 citrus varieties and proven effective on the big three in Florida – oranges, grapefruit and tangerines.

Dead citrus trees in Florida. Citrus greening is devastating the US citrus industry, killing trees within five years of infection.



DISEASE & WEED CONTROL



The Florida citrus greening trial site in 2020. Before Vismax treatment.



The same tree eight weeks after foliar application of Vismax. Note growth flush, greener leaves and improved overall plant health.

Dr Thompson is optimistic about the sustainable impact of the patented, naturally-occurring peptide solution and its promise to restore tree health and grower revenue.

“It triggers a powerful, long-term effect in the plant to defend itself against bacterial and fungal diseases. Because it doesn’t directly target microbes, there is little-to-no risk of microbial-resistance building over time. There are also no adverse impacts on fruit taste or appearance, which can occur with other treatments,” he said.

Elemental Enzymes senior scientist and head of biochemical pesticides Dr **Michelle Leslie** says using natural, non-toxic peptides to turn on the plant’s immune system is an effective way to fight a wide range of plant infections, and a safer alternative to widespread antibiotic use which threatens ecosystems and human health.

“It’s striking to see the effect a small peptide can have on such heavily-infected trees. The impact of this small peptide may reach well beyond the citrus grove.

“Elemental Enzymes research shows similarly positive results on diseases in a broad range of row and specialty crops, including apples, almonds and grapes,” Dr Leslie said.

Elemental Enzymes Australia has trial work with Vismax currently underway in several Australian commercial crops other than citrus.

Unlike conventional crop protection companies, Elemental Enzymes is taking a new approach, seeking more sustainable, innovative, cross-disciplinary scientific solutions to the complex problems that impact on commercial agriculture.

The company says it is working on creating enzyme, peptide and other natural solutions to improve nutrient uptake, water management, plant health and yield.

Some 140 patents have already been filed, in the US, 10 products have been commercialised so far, and an additional nine products (including the citrus greening solution) are pending commercialisation.

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